The acidity immediately after a meal is nil, but steadily increases during digestion, and is less in the very young than in the older. On a barley water diet free hydrochloric acid appears in the stomach in a few minutes, but on a milk diet it does not show itself for an hour or more, due to the fact that the casein absorbs it or combines with it in some way, and the free acid does not appear until the casein has taken up all required for its complete digestion. The free acid appears later in disease than in health, due to the increased amount of food in the stomach and to the slower secretion of the acid; in cases of pylorospasm the acidity is increased. Opinions differ as to the occurrence of lactic and volatile fatty acids, but these probably do not occur in healthy breast-fed infants, while in those ill or on cows' milk they are fairly common. Part of the acidity is probably due to a fat-splitting enzyme in the infant's stomach.

Pepsin is present at all ages and in all kinds of health, and acts in the infant stomach though to a less degree than in the adult. The peptic digestion goes on to the stage of peptones, but not beyond that. The fact that the stomach contents will not digest fibrin in the thermostat is due to the fact that all the hydrochloric acid is combined with the casein, and while the protein with which it is combined will be acted upon by the pepsin, a foreign protein without the addition of more acid will resist the enzyme.

Rennin occurs in the stomach after the first few weeks of life; whether during the first week is a moot question.

SYPHILIS OF THE STOMACH AND INTESTINES.

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Syphilis of the stomach, next to tuberculosis, the rarest of stomach diseases, was first described by Andral[1] in 1834. Since then, however, a number of cases have been reported, but the number of authenticated cases is still very small. Chiari,[2] for example, in 243 autopsies on syphilitic subjects, found only 2 undoubted cases of stomach syphilis. Stolper[3] and Fraenkel[4] report similarly to Chiari, but Aristoff,[5] on the other hand, maintains that careful histological examination of the stomachs of luetic subjects frequently reveals syphilitic changes in the form of miliary gummas and diffuse syphilitic inflammation.

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[1] Clinique médicale, Paris, 1834, ii, 201.

[2] Internat. Beit. z. Wiss. Med., Festschrift für R. Virchow, Berlin, 1891, vol. ii.

[3] Bibliotheca medica, 1896, Heft 6.

[4] Virchow's Archiv, Band clv.

[5] Ztsch. f. Heilkunde, Berlin, 1898, Band xix.

For many years all healed scars in the apices of the lungs were considered tuberculous; latterly, it has been recognized that many such scars are luetic in origin, that pulmonary syphilis is by no means so rare as it was formerly supposed to be. Similarly, more careful examinations will reveal the fact, as Aristoff has indicated, that gastric syphilis is not merely a medical curiosity. At present we may suspect specific stomach disease in all luetic subjects who have an intractable dyspepsia which does not yield to the ordinary procedures; but further than that we cannot go. There are no special symptoms which point to stomach syphilis except a definite luetic history and improvement under specific treatment—and even this last may prove deceptive, because we know that mercury and the iodides are alone sufficient to cause intractable dyspepsias, and that when they are discontinued the gastric symptoms abate. The only definite clinical symptom which may prove of value is the fact that the mucous membrane of syphilitic subjects bleeds very readily, and that the introduction of the stomach tube for diagnostic purposes is often followed by profuse hemorrhage. This is a secondary manifestation due to syphilitic hemorrhagic diathesis, and has been noted by Zeissel.[6] If in such cases an ordinary ulcer can be excluded, we may hit upon the real cause of the stomach trouble. This bleeding occurred in one of my own cases, and led to the suspicion of syphilis. Antiluetic treatment soon caused the patient's stubborn stomach disorder to disappear, and readily confirmed my suspicions as to the nature of the disease.

Gastric lues appears in three forms: (*a*) As syphilitic ulcer; (*b*) as syphilitic tumor; and (*c*) as syphilitic stenosis of the pylorus. This last, the rarest of the three forms described, may cause a diffuse cellular thickening of all the layers of the pyloric end of the stomach, and can readily be mistaken for a carcinoma. It may infiltrate the smaller curvature of the stomach, or may be confined to the pyloric end; for in syphilis, as in carcinoma and tuberculosis, the smaller curvature and the distal end of the stomach are the sites of predilection. Depending on the location of the lesion, the stomach may be small or dilated. Syphilis of the stomach has been found from the twenty-third to the seventy-third year; it may be hereditary or acquired; it occurs twice as often in men as in women; and when recognized surgically or on the postmortem table it is always of the tertiary type, whereas, when discovered clinically, it is usually of the secondary type. The disease may appear from the second to the fourth year after the primary lesion, though in hereditary lues the symptoms have been known to manifest themselves after a lapse of twenty-five years.

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[6] Wien. med. Presse, 1902, xliii.

PATHOLOGY. The greatest number of cases described were of the acquired form, but they may also be of the hereditary type. Büttner[7] reports three cases in fœtal life, which, added to those already reported by Klebs, Cornil and Ranvier, Weichselbaum, Birch-Hirschfeld and Chiari, make only twelve cases in all.

In hereditary syphilis miliary gummas are found in the mucosa, submucosa, muscularis, and peritoneum. The vessels are narrowed and thickened, with here and there endarteritis obliterans. In the tissues themselves there are diffuse infiltrations, with necrosis and ulceration, but rarely complete perforation. In addition, embryonal tissue is frequently found. The acquired form of syphilitic gastritis manifests itself two to four years after the appearance of the chancre, and may appear pathologically as:

1. *Diffuse syphilitic gastritis,* with hyperemia and round-cell infiltration of all the layers of the stomach. It differs from ordinary gastritis in the greatly increased number of round cells in the submucosa and the formation of true gummas. Often, however, the pathological changes in the stomach are secondary to the morbid changes in the liver, pancreas, and small intestine. The gummas are the most characteristic growths found in gastric lues, and appear as more or less indurated plaques, or as vast zones of infiltration, going to the extent of a concomitant perigastritis. The number of these gummas is various; often they are exceedingly numerous, and they may vary in size from a few centimeters to the size of the palm of the hand. They are generally dirty white or yellow in color, rarely reddish, with hard, well-defined borders. Cross-section shows thickening of all the coats. Histologically, only the submucosa shows gummatous infiltration, while, as a result of the production of new tissue composed of embryonal cells and dense fibrous tissue, there is compression of the peptic glands and the usual luetic changes in the bloodvessels.

2. *Ulcers.* Syphilitic ulcers may exist alone or may be associated with gummas. Like simple peptic ulcers, they may be multiple, though they are usually solitary. They may be found anywhere, but the site of predilection is the posterior aspect of the cardia and the pylorus. They are usually round or oval, though occasionally irregular in form, and vary in depth from superficial erosions to complete perforation, either perforating rapidly into the free peritoneal cavity or more slowly with attendant perigastritis. Characteristic for this lesion are thickening of the mucosa and submucosa and nodules of infiltration followed by central necrosis, together with the constant finding of endarteritis and endophlebitis. The scars from healed syphilitic lesions are of doubtful value in a correct diagnosis, and are usually hard, white, and stellate.

In the earlier stages of these syphilitic lesions there is a tendency to extend into the muscularis, the mucosa being affected much later. In the last stage of the development of the disease there is the usual obliterating arterial change found in all syphilitic lesions, thickening of the serosa with adhesions to the neighboring organs, and sometimes hyaline thrombosis with organization. Very commonly the ulcer extends deeply into the muscle, this being especially characteristic of syphilitic lesions everywhere.

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[7] Prag. med. Woch., 1893, xviii.

3. *Tumors of syphilitic origin* are found but rarely in the literature and then only in postmortem records. In Einhorn's[8] cases, as in those that came under my own observation, all presented clinical characteristics of true carcinomas. There was progressive emaciation, together with all the other earmarks of malignant growth. Chemically, the stomach contents varied from the normal amount of free hydrochloric acid to complete absence thereof. Lactic acid was also absent, but there was present a considerable amount of sticky mucus streaked with blood. In the cases of syphilitic pyloric stenosis described by Einhorn, there was ischochymia coincident with the presence of a large, round, oval tumor at the pylorus. Two such cases came under his observation, and are probably the only ones which have been recognized clinically. Both of these cases improved under antisyphilitic treatment, though, as he rightly says, it may be seen readily that surgical intervention might have to be resorted to in order to correct the mechanical difficulty resulting from the syphilitic process.

I append the report of two cases of syphilitic tumors of the stomach which came under my personal observation:

CASE I.—An old lady of sixty years, greatly emaciated, with nothing special in her previous history except two or three miscarriages, presented herself in the clinic with distinct gastric symptoms. There was loss of appetite and occasional vomiting of sour masses; at times also particles of food that she had taken the day before. Upon examination, a hard nodular tumor was felt in the region of the pylorus, and a diagnosis of carcinoma made. The patient then disappeared from observation for at least several months, when, much to our astonishment, she reappeared, after we had long consigned her to the land beyond. On physical examination the plyoric tumor was unchanged, but it was now possible to feel over the right border of the liver a second tumor, hard, nodular, and similar in consistency to the first one described. On account of the history of her miscarriages, vigorous antiluetic treatment was instituted, and the patient rapidly improved, though when I last saw her the tumor had not materially decreased in dimensions, our experience in this respect not being similar to Einhorn's.

CASE II.—The second case was almost exactly like the first described, only the patient was a male. When I last saw him he was in a fairly good physical condition, the antisyphilitic treatment which was instituted having had a pronouncedly favorable effect on his symptoms.

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[8] Archiv f. Verdauungskrankheiten, vi, 150.

These two cases show us the importance of giving the patient the benefit of the doubt in all so-called inoperable cases of carcinoma by giving them strict antisyphilitic treatment, which can in no case do them any harm and may be of great benefit.

SYMPTOMS. The symptoms of syphilitic gastritis are very diverse. They are commonest in the secondary stage and are due to a variety of causes. First and foremost, they may result from the general inanition and anemia attendant on syphilis, and, as in many other constitutional diseases, are not especially characteristic. We may have excretory or motor disturbances, with their attendant symptoms, such as hyperacidity, hypoacidity, and occasionally total absence of stomach secretions. Sometimes the stomach may fail to emply itself promptly, and in such cases there may even be intractable vomiting, approaching in severity gastric crises. Unlike the crises of tabes, however, these attacks readily yield to antiluetic treatment. In another class of cases the vomiting is somewhat less severe, but more persistent, resembling in some degree the vomiting of pregnancy. There is great variation in appetite, from complete anorexia to bulimia, attended by great thirst.

In tertiary syphilis, which is usually diagnosticated only at operation or on the postmortem table, the symptoms are very obscure. There may be, but rarely, the symptoms of acute gastritis, with its attendant pain, belching, and vomiting. Commoner is the chronic form of gastritis with pain and tenderness, the pain being commonly more severe at night, irregular vomiting, anorexia, associated with diarrhœa and meteorism—symptoms refractory under ordinary treatment, but readily controlled by specific treatment.

More important is syphilitic gastric ulcer, which differs clinically in no wise from ordinary peptic ulcer except in its peculiar intractability to all ordinary medical treatment, though it is more easily controlled if to the usual procedure of diet and rest are added the antiluetic treatment. Syphilitic ulcers may, for purposes of clinical description, be divided into three groups: (1) Those which are preceded by stomach trouble, without anything especially characteristic about them; (2) the acute variety, like the ordinary round ulcer; (3) those which first run a latent course, and then suddenly manifest themselves by an alarming hemorrhage.

The prognosis naturally depends upon an early recognition of the condition, some cases running a fulminating course.

In syphilitic ulcer of the stomach there may be pain about the ensiform, radiating through to the back, hematemesis, melena, etc. Fournier,[9] for example, tells of a stomach hemorrhage in a woman who had acquired lues six years previously, and who recovered completely after antisyphilitic treatment was instituted. Flexner[10] reports an undoubted case of perforating syphilitic stomach ulcer. Mackay[11] reports a syphilitic ulcer with hematemesis in a young man, suffering from hereditary lues, who was greatly benefited by the use of mercury and the iodides.

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[9] Klin.-therap. Woch., 1900, vii.

Einhorn, unlike Fraenkel, believes that stomach syphilis is not a rare condition. He reports three kinds of cases: (*a*) Ulcers on a luetic basis; (*b*) syphilitic tumor of the stomach; (*c*) syphilitic pyloric stenosis; and he cites a number of cases in support of his views.

Gaillard[12] also concludes that stomach syphilis is not as rare as had been previously supposed, and wonders why it is not as reasonable to attribute ulcerations lower down in the intestinal tract to the same cause (namely, syphilis) as those which attack the buccal mucous membrane and pharynx; in support of his views he cites a number of authors to support his contention, such as Andral, Hayem,[13] and others, who have successfully cured obscure dyspepsias with mercury and the iodides. Anatomically, gastric scars in syphilis have been found by Frerichs, Chvostek, and others; and gummas by Klebs and Carril; while simple round perforating ulcers in luetic individuals have been described by Murchison and Fraupé. The last-named author comes to the following very necessary conclusions: (*a*) That gastric syphilis is not as rare as has been supposed; (*b*) that there are three anatomical lesions of a syphilitic character; (*c*) that the treatment bears out the suspicions of the luetic basis of many obscure stomach lesions.

L. Gaillard's views of syphilitic stomach disease are embodied in the following pathological summary: (*A*) Hereditary lues, in which are found miliary gummas, first in the mucosa and submucosa; later, in the muscles of the peritoneum, with obliterating endarteritis. Diffuse infiltrations, with the formation of embryonal tissues. Necrosis and softening of the syphiloma. Ulcerations are frequent, perforations exceptional. (*B*) Acquired syphilis, with morbid findings, such as have already been discussed.

Here I refer to a number of cases of stomach syphilis reported by Hayem, Morgan,[14] Hoover, Hemmeter and Stokes,[15] which are exceedingly interesting, but of which, for the sake of brevity, I must omit more detailed mention. Nor can I in the space allotted me do more than refer to gastric cirrhosis following syphilis, which has received considerable attention from French authors; nor shall I enlarge upon the interesting case reported by Lafleur,[16] which was exceedingly suggestive of malignancy until microscopic examination proved it to be specific.

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[10] Amer. Jour. Med. Sci., 1899, n. s., vol. cxvi.

[11] Lancet, London, 1898, vol. ii; Syph., Paris, 1903, vol. i.

[12] Presse méd., Paris, 1897.

[13] Ibid., 1906, vol. xiv; Rev. de Méd., Paris, 1889, vol. ix.

[14] American Medicine, Philadelphia, 1906, n. s., vol i

[15] Johns Hopkins Hospital Reports, 1900, vol. ix.

SYPHILIS OF THE INTESTINE. In Büttner's cases of congenital syphilis of the stomach there was, as already stated, syphilis of the small intestine. Hayem and Tissier report similarly in reference to a case of syphilis in which the patient, a woman journalist, aged thirty-three years, was admitted to the hospital. She gave a history of having what was called scrofula and hemiplegia, which, however, lasted only two months. She was now admitted to the hospital in a typhoid state, presenting on examination a papulosquamous syphiloderm. She died on the fourth day, and at the autopsy numerous ulcers in the cecum and colon, of various dimensions, irregular and round were found. The borders were indurated, the base whitish, covered with a purulent exudate, and surrounded by a reddish areola. Microscopically, there was found infiltration of all the layers, with congestion of the vessels, which also showed an end- and peri-artertitis.

Hueter[17] reports the following case of a woman, aged forty-four years, who for the past four years had enlarged inguinal glands and obstinate diarrhœa. Death resulted from intercurrent pneumonia. At the postmortem there was found, in addition to lues of the rectum and arch of the aorta, multiple ulcerations in the lower ileum, with corresponding constrictions and ampulla-like dilatations between the strictures. The distinguishing features which speak for lues of the intestine are: multiplicity of the lesions collected in groups, the tendency to ring-like formation, and plaque-like infiltration, all of which were present in this case.

Similarly, Gutman[18] reports a case with autopsy findings, and gives general conclusions thereto. A woman, aged forty years, was admitted to the hospital suffering from diarrhœa and great loss of weight. She had had no abortions, and her history was negative as to alcoholic excess, lues, or tuberculosis. On the day of admission she had chills, accompanied by fever, which continued, with remissions, until seven weeks later, when she died of pneumonia. No tubercle bacilli were found in the sputum or feces. At the autopsy, after the omentum was uncovered, the small intestine from the jejunum down presented a number of annular constrictions, with dilatation of the gut between them. The peritoneum over these places was thickened, as was also the mesentery. On opening the bowel, it was found that the annular constrictions described corresponded to ulcers on the mucosa. The ulcers were flat, the edges undermined here and there, the base smooth, bluish red or yellow, and firm to the touch. No nodules were found.

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[16] Montreal Medical Journal, 1903, vol. xxxii.

[17] Münch. med. Woch., 1906, vol. liii.

[18] Deut. med. Woch., 1903, vol. xxix.

Microscopically, the floor of the ulcer was found to be formed of the submucosa, which was infiltrated with round or polygonal cells, invading the muscularis and serosa, and extending to the mesentery. No tubercles or giant cells were found, though obliterating endarteritis was present.

The case of syphilis of the intestines which came under my own observation follows: The patient, a male, aged thirty-eight years, had always been well, except for syphilis acquired fifteen years previously. During the last three years before consulting me he suffered from intractable diarrhœa, with fourteen or fifteen bowel movements daily. The stools were thin and watery, with an admixture of blood and pus. Neither the rectoscope nor sigmoidoscope showed the presence of an ulcer; however, upon deep palpation over the sigmoid, exquisite tenderness was elicited. From this fact, and on account of the previous luetic history, a tentative diagnosis of syphilitic ulcer of the bowel was made and a vigorous antisyphilitic treatment instituted, intravenous injections of 1 per cent. bichloride of mercury being given. Within a very short time the diarrhœa stopped, the stools became formed, and their number reduced to one daily, in spite of a liberal mixed diet.

From the history and results of treatment, we may add this case to those already enumerated, although we have no anatomical findings to support our diagnosis. Such cases may run with a low continued fever, reminding one somewhat of typhoid, and are often very puzzling. If, however, we take into consideration the fact that the pathological anatomists have shown that syphilis may cause retracting and radiating scars of the intestine, besides involvement of the bloodvessels in an obliterative endarteritis, there is no reason why we cannot look upon syphilitic enteritis as a clinical entity, in which the symptoms may be due either primarily to the syphilitic toxin, or secondarily to the anatomical changes of syphilis.

Fournier was the first to call attention to the existence of a febrile affection like typhoid fever due to syphilis of the intestine. He sees no reason why the luetic virus, attacking every other organ, should not as well affect the intestine. The addition of scars, retracted and radiating, involvement of the peritoneum and bloodvessels, establish the contention that syphilis of the gastro-intestinal tract is not a clinical curiosity, but a well-defined condition with characteristic lesions.

Homen[19] reports a case of a man, aged twenty-three years, who for many years had gastro-intestinal trouble. He gave a direct luetic history, for which he was treated, with apparently fair recovery. Later, however, he commenced to have nocturnal abdominal pains, diarrhœa alternating with constipation, bloody stools, and abdominal distention. He died of an influenzal pneumonia. At autopsy the small intestine was found to have been constricted in thirty different places by scars, 1 cm. wide, and circularly disposed. Over the mucosa there were over thirty ulcers with smooth bases and thickened edges. The submucosa was greatly infiltrated.

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[19] Central. f. allg. Path. u. pathol. Anat., Jena, 1893, iv.

CONCLUSIONS. The diagnosis of stomach syphilis can be considered probable if, with luetic history and specific scars, there are found at the same time gummatous infiltrations. The hemorrhages can most easily be explained by concomitant portal obstruction. Clinically, the fact must not be lost sight of that in luetic subjects who have been overdosed with iodides and mercury there are often profound digestive disturbances, and that these disturbances must in no wise be confused with gastric lues, for in gastric syphilis the stomach symptoms improve under specific therapy, whereas the first named are aggravated by Hg and KI.

The conclusions drawn by Reder as regards lues of the small intestine are: (1) Ulcers are found in the entire small gut, especially in the lower jejunum; (2) they always occur in groups, and the number thereof may be very great; (3) they are always annular, and the floor is deep and smooth; (4) they always produce stenosis; (5) they are all similar histologically; and (6) the lesion begins with a new cellular infiltration, surrounding the vessels especially.

TREATMENT OF SYPHILIS OF THE STOMACH. From the foregoing it will be readily seen that when there is suspicion of a syphilitic etiology for otherwise obscure stomach trouble, we must proceed with the greatest caution in instituting antisyphilitic treatment. It must not be forgotten that this disease causes profound pathological changes in the stomach itself, and that for this reason the use of the specific treatment usually employed will not be sufficient to remedy the disease. To begin with, the iodides and mercury, if their use is determined upon, must be given in such a form as not to cause further irritation to the stomach. The mercury should therefore not be given by the mouth; it is best exhibited in intravenous injections—as 1 per cent. bichloride of mercury in a dosage of 0.5 to 1 c.c., given three or four times a week. The iodides are particularly obnoxious to a sensitive stomach, and should either be given per rectum, in the proper dosage, or, if given by the mouth, should be well diluted; moreover, it has been found that the sodium salt is less irritating to the stomach than the potassium. Mercury may also be given in the form of inunctions. The inunctions should be given six days in succession, and on the day on which they are omitted it is well to advise a Turkish bath. Mercury may also be given intramuscularly, with the usual precautions, and for this purpose a 2 per cent. oxycyanide may be chosen. In addition, as before indicated, the diet should be carefully regulated, as it would be in any other corresponding stomach disease. If there are hemorrhages, the patient should be put at rest in bed with rectal feeding, and if surgical complications arise, they should be treated as any other surgical complications would be, irrespective of the syphilis. A constricting tumor of the pylorus, for example, if followed by dilatation of the stomach and intractable vomiting, which does not yield to syphilitic medication alone, should be excised or a gastroenterostomy should be performed, even though syphilitic subjects are, as a rule, poor surgical subjects. Yet in these cases we should not hesitate any more than we would in cases of diabetes, when the indications are to save life, even in spite of the diabetes. When once the stomach symptoms have abated, the patient should be given to understand that repeated antisyphilitic cures are necessary, in order to avoid constitutional symptoms in the future.

THE LIVER IN TUBERCULOSIS.

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The liver in tuberculosis has been studied by a number of observers in the course of the last century. By the earlier observers it was thought to be only rarely the seat of tubercles or other manifestation of the general disease, but with the improvement of the microscope and histological methods, we find that very few cases of tuberculosis go to autopsy without some evidence of the disease in the liver.

Louis,[1] in 1843, found tuberculosis of the liver but twice in 120 autopsies on tuberculous subjects. Forster,[2] in 1854, was able, after a prolonged search, to find but three cases of hepatic tuberculosis. In an investigation undertaken by Bristowe,[3] in 1858, to discover the relation between liver abscess and intestinal ulceration, he found that of 167 cases of tuberculous ulcers of the intestine, but 17 showed "tuberculous cavities of the liver." Waldenberg,[4] in 1869, reported that it is the organ most frequently affected in experimental tuberculosis, but this is due to inoculation into the peritoneal cavity. Arnold,[5] in 1880, considered it an almost constant finding in cases of tuberculosis. Simmonds,[6] in 1888, found it in 76 per cent. in adults, in 92 per cent. in children, and in 78 per cent. in general. Zehden,[7] in 1897, found miliary tubercles in 50 per cent. of fatal cases, corresponding with the frequency of intestinal ulceration. Rolleston[8] is inclined to put it at a lower figure than 50 per cent. Rosenberger,[9]

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[1] Recherches sur la phthisie, Paris, 1843.

[2] Handb. der spec. path. Anat., 1854.

[3] Trans. Brit. Path. Soc., 1858, ix, 241.

[4] Die Tuberculose, Berlin, 1869.

[5] Virchow's Archiv, 1880, Band. lxxxii.

[6] Deut. Archiv für klin. Med., 1888.

[7] Cntrlbl. für path. Anat., 1897, viii.

[8] Diseases of the Liver.

[9] Trans. Phila. Path. Soc., 1906, ix.